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TITLE: **METHOD AND DEVICE FOR APPLYING ADHESIVES**

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METHOD AND DEVICE FOR APPLYING ADHESIVES

Field of the Invention

This invention relates to spraying devices, and in particular to a transportable adhesive sprayer system and method of applying adhesive, such as an adhesive utilized to adhere carpet to a floor.

Background of the Invention

In the art of applying adhesives for adhering carpet to a flooring or other material, a number of methods and/or systems have been developed. One method of applying carpet adhesive to a floor is to remove a supply of adhesive from a pail, such as a 5-gallon pail, and spread manually with a trowel or other device. This method of applying adhesive is labor intensive and may involve additional clean-up efforts compared to more automated methods. Furthermore, the adhesive is not in a closed container or system during the application process whereby foreign material could end up in the adhesive mixture by falling in the pail or by being inadvertently introduced by the manual spreaders.

Carpet adhesives normally come in pails, such as 5-gallon pails. One company, Roberts Consolidated Industries, Inc., of California, makes a spray adhesive system which is capable of dispensing adhesives directly from such a pail. The Roberts Spray Adhesive System utilizes a sprayer having an electric motor capable of delivering approximately ½ gallon of adhesive per minute. The pump utilized for that sprayer may be varied in speed to control the flow. The pump has a suction including a suction tube which may be deposited within an open bucket situated on the floor below the pump. The pump discharge goes through a length of hose and a spray gun extension in order to spray the adhesive on the flooring surface. This sprayer system

does not provide the capability of preventing contaminants from falling into the open bucket of adhesives. Additionally, the open bucket, when exposed to external atmospheric conditions over a period of time, will likely cause the adhesive to dry and/or cure in the bucket prior to being discharged through the sprayer gun. This may result in skinning in the bucket or clogging of parts of this spraying system. Additionally, significant clean up may be required after using this spraying system. Furthermore, the pail is not an integral part of the spray system so that each time a user desires to move the sprayer, the pail must be picked up and the sprayer moved and the user must be careful not to drip or spill the adhesive from the suction or from the pail. In short, the Roberts System is not a sealed system, is not as easily moved from room to room as desired, and may be messy to operate and clean.

A second type of adhesive spraying system known in the art is represented in a product built by the AAT Company. The AAT adhesive sprayer utilizes an air compressor which pressurizes a tank containing adhesives which are then forced through a nozzle in a sprayer. In general, pressurized systems are less favored for two principal reasons. First, in order to maintain a pressurized system, all of the seals and fittings need to be maintained so that they are capable of having an airtight seal. Secondly, in the event of a component failure, the potential for explosive adhesive release exists. One sprayer embodiment of the AAT variety utilizes an 8-gallon tank for the pressurized container. This pressurized tank becomes a pressure pot when filled with compressed air and adhesive. A small hole is located on top of the pressure pot for filling of the pressure pot with adhesives. This small hole is believed to make the filling of the pressure pot difficult, messy, and subject to spills. Once the adhesive is added to the tank, the tank is then closed and pressurized. During the filling of the container with the adhesive, the

adhesives come into contact with the atmosphere and the sprayer device is not a closed system. Debris or other foreign matter may enter into the pressure pot during the filling of the adhesives and some amount of skinning or clogging may occur. Additionally, skinning, curing and clogging may occur within the pressurized pressure pot. Furthermore, this device utilizes a sprayer similar to one which may be found in an self-service car wash station. There is no capability for this sprayer to have its tips switched according to the needs of the user.

The X-lent Equipment Company also markets sprayers which operates similar to the AAT product. One version plugs into an air compressor, while the other version has an air compressor as part of the system. These two products both utilize air in a pressure pot to force adhesive through a hose assembly and then through a sprayer having a nozzle. Essentially the compressor builds up pressure within the pressure pot and then the adhesive is blown out the bottom. This system is not a closed system because the pressure pot must be opened and exposed to the atmosphere for adhesive to be added, presenting curing and contamination issues. The pressurized air within the pressure pot is also believed to present curing and contamination issues. The system also suffers from the disadvantages of pressurized systems.

In the pressure pot systems where the adhesive is then disposed through a hose, the fluid dynamics of the pressure pot and hose are believed to result in a loss of head along the length of the hose. Accordingly, some versions of the X-lent products have maximum hose lengths of 75 feet, and some have a maximum length of 100 feet. With a 5 ½ horsepower motor attached to an 11 or 13 cubic feet per minute compressor with all X-lent pressure pot types, it is believed that there will be a maximum hose length for effective use.

Another manufacturer of pressurized spraying systems is TACC International Corporation located in Rockland, Maryland. The TACC Systems utilize a pressurized containers, similar to a propane tank, which has adhesive therein. These aerosol spray cans and cylinders are advertised as being highly portable, requiring no outside air or power support and available in both returnable and disposable cylinders. Although the TACC adhesives spraying systems are completely closed systems as far as the user is concerned, they are not refillable or reusable by the user without first returning the containers to the manufacturer for refilling.

As previously discussed, most carpet adhesives are sold in five gallon pails. One company, the Taylor Company, has previously sold carpet adhesives in a cardboard box. However, within their cardboard box was a baggie containing the adhesive. In order to utilize the adhesive within the baggie, the baggie was pulled up and around the cardboard box and the adhesive was scooped out. In use, the adhesive was exposed to atmospheric curing and contamination. It is not believed that this system was, or is, commercially successful.

Accordingly, a need exists for a closed adhesive spraying system, sprayer and method. Furthermore, a need exists to have an adhesive container system adapted for use in an atmospherically closed environment.

Summary of the Invention

Accordingly, it is an object of the invention to provide an adhesive spraying system and method with a positive displacement pump having a suction connected to a collapsible polyethylene container containing adhesives.

It is a further object of the invention to provide a portable spraying system.

It is another object of the invention to provide an adhesive spraying system which does not utilize a pressure pot.

It is a further object of the invention to provide an adhesive spraying system and method which prevents foreign matter and debris from contaminating the adhesive.

It is yet another object of the present invention to provide an adhesive spraying system to utilize at least two varieties of adhesives without extensive clean up to transition from one adhesive to another.

Still another object of the invention is the ability to utilize and store the adhesive sprayer system without clean up and then reutilize the sprayer system with minimal effort.

Accordingly, the method, system and sprayer disclosed herein include a positive displacement pump with the inlet connected to a dispensing nozzle of a reducible volume container. The reducible volume container may be located within a more rigid container such as a cardboard box. As the positive displacement pump is operated, a suction on the collapsible container is drawn by the positive displacement pump. The pump pumps the adhesive, or other material, preferably into an attached hose and through a bayonet type spray wand. The spray wand may have replaceable spray tips to alter the spray coverage, and may be activated by a trigger.

Brief Description of the Drawings

Fig. 1 is perspective view of the preferred embodiment of the spraying system and spraying device according to the present invention with a portion of the top of the sprayer shown in phantom.

Fig. 2 is a front plan view of the sprayer with the interior shown in phantom.

Fig. 3 is a back plan view of the device shown in Fig. 2.

Fig. 4A is perspective view of a cardboard box for housing a flexible container as utilized in the preferred embodiment.

Fig. 4 B is a perspective view of a partially filled flexible container utilized with the preferred embodiment.

Fig. 4 C is a perspective view of the cardboard box of Fig. 4A housing the flexible container of Fig. 4B.

Fig. 5 is a perspective view of the sprayer similar to Fig. 1 with an additional adhesive container attached.

Repeat use of reference numerals in the present specification represents like, similar and analogous parts, future drawings of the present invention throughout several views.

Detailed Description of the Preferred Embodiment

The present invention is concerned with the application of coatings including adhesives, and more specifically to a method, system and sprayer for applying adhesive, or another material, to a surface. Accordingly, Fig. 1 depicts the adhesive application system **10** including an adhesive container **20**, a sprayer **30**, and a spray wand **40**.

The adhesive container **20** is preferably a collapsible type container. One example of a presently preferred container is the type manufactured by Hedwin Company of Baltimore, Maryland. This container features a cardboard box **22** shown in Fig. 4A with an opening **24**. Fig. 4B is a reducible volume container **26** which fits within the cardboard box **22** as is illustrated in Fig. 4C. The reducible volume container **26** preferably has an opening, illustrated as a dispensing nozzle **28**, which may accept a screw on, or other type of cap and connectors. The

reducible volume container **26** may be constructed of linear low and low density polyethylene ("LDP") manufactured in the form of a liner for use in the cardboard overpack **22.** The polyethylene container is designed to collapse as product is dispensed. The design is intended to allow product to flow from the polyethylene container in a continuous, uninterrupted stream. Alternatively, the reducible volume container **26** may be made of any other deformable material or materials. Additionally, the reducible volume container **26** could be constructed of more rigid materials such as a rigid tube with an end that moves within the tube to reduce the volume as the product is utilized, of the style typically employed with caulking compounds. Nevertheless, the cardboard box **22** with internal reducible volume container **26** has been found effective in storing and stacking the adhesive containers **20**. The cardboard box **22** may, or may not, be utilized depending on the particular application desired.

The preferred adhesive container **20** has about a five gallon capacity. Some pressure sensitive adhesives used with this system **10** have had an effective coverage area of approximately thirty or more square yards per gallon. Other adhesives such as vinyl adhesives and/or multipurpose adhesives may also be utilized with this spray system **10.** If multiple adhesive containers **20** are stacked on the sprayer 30 and connected to the pump, over 5000 square feet may be covered with adhesive without reloading.

The use of the reducible volume container **26** may allow the user to pump a container **26** dry without losing suction. If a plurality of reducible volume containers **26** are connected together, they may all be pumped from simultaneously. Alternatively, containers may be sequentially selected to be pumped from one at a time.

An adhesive container **20** is illustrated atop a portion of the sprayer **30** in Fig. 1. Additionally containers **20** can be stacked alongside and on top of one another on the sprayer **30**. If more than one container is utilized, such as containers **20, 90** illustrated in Fig. 5, more than one adhesive type may be dispensed from the plurality of containers **20, 90** without requiring cleaning of the system **10**. Although the container is illustrated in Fig. 1 as being at least partially held by recessed portion **32**, alternative and/or additional securing mechanisms including cinching belts, bungee cords and the like may be utilized. Alternatively, a user may not find it necessary to securely attach the container **20** to the sprayer **30**.

The adhesive container **20** is connected to the sprayer **30** by a supply tube **34**. A first end of the supply tube **34** with a connector **36** preferably attaches to the dispensing nozzle **28** of the reducible volume container **26**. The use of a T-joint on the first end of the supply tube **34** will permit it to be simultaneously attached to two adhesive containers **20**. The second opposed end of the supply tube **34** is preferably connected to the inlet of the pump **38** illustrated in Fig. 2. In order to access the pump and tubing, an access panel **42** may be located on the housing **44**. The pump **38** is preferably a positive displacement type pump such as a piston pump spray pump manufactured by Air Lestro Duratech. A suitable pump utilizes a 3/4 horsepower DC drive. A rheostat **46** may be utilized to control the pressure at the exit of the pump **38** as is illustrated in Fig. 3.

A first portion of the supply tube **34a** may be connected to a manifold **48**, shown in Fig. 2, especially if a plurality of containers **20, 90** are connected to the sprayer **30**. The manifold **48** will allow a user to select which of the first tube pertains **34a** and containers **20, 90** are supplying adhesive through the second tube portion **34b** to the pump inlet **50**. A manifold **48** could allow

the use of quick disconnect connections from the supply tubes **34** to the manifold **48**. The manifold **48** may include valves and can be utilized to select the particular containers **20**, **90**.

In a preferred embodiment, the pump **38** utilizes a standard 115 VAC electrical connection and draws approximately six amperes of current . The sprayer **30** may be parked near an electrical outlet and then use the spray hose **66** to conduct adhesive to the locations for application of the adhesives. Alternatively an electrical cable of sufficient length may be utilized to locate the sprayer **30** a significant distance from an electrical outlet. Additionally, the pump **38** may be supplied with electricity from a generator or other source.

The pump **38** is shown mounted within the housing **44** of the sprayer **30**. One or more brackets **52** may secure the pump **38** to the housing **44**. The housing **44** of the sprayer **30** is mounted on a mobile base as illustrated in Figs. 1-3 and 5. This hose utilizes four wheels, however other base designs may also be utilized. The two front wheels shown are swivel coasters **56**. The two back wheels shown are tires, such as pneumatic tires **58**, mounted on axles **60**. A mobile base not only facilitates moving the sprayer about the buildings where adhesive is applied, but also in loading and unloading the sprayer on trucks for transportation between jobs.

A handle **62** connected to the mobile base and/or housing **44** is helpful in moving the sprayer **30**. A front platform **64** may serve as a bumper and may be utilized to store the spray wand **40** and hose **66** when moving the system **10**. The larger rear tires **58** have been found effective to allow users to roll the sprayer **30** on the back wheels like a dolly. Alternatively, the mobile base may be rolled on all four wheels. The housing **44** is preferably a sheet metal or plastic covering over a frame. Additionally, the housing **44** should be narrow enough to fit within most standard doorways.

The pump **38** is located within the housing **44** to minimize its exposure to dust and overspray. An on/off switch **84** may be utilized to turn the pump **38** on and off as shown in Fig. 3. Additionally, the pump **38** may have an optional drive control **86**. This configuration for controls **80, 46, 84** has been found effective to minimize the cleanup required after using the system **10**. In testing the embodiment illustrated and described herein, the sprayer **30** was operated with a container **20** of adhesives. The sprayer **30** and adhesive container **20** were left attached and stored. Approximately three weeks later, the same container **20** of adhesives was utilized after removing a small amount of adhesive that had settled in the spray tip **74** of the spray wand **40**.

The pump outlet **68** is connected to outlet connector tube **70** as shown in Figure 2. The outlet connector tube **70** connects the pump outlet **68** to the spray hose **66** at outlet connection **72**. The connection **72** allows for the removal of the hose **66** and spray wand **40**.

The adhesive is preferably pulled by suction from adhesive containers **20** through supply tube **34** into the pump **38** and pumped out tube **70** to connection **72** and through the spray hose **66** to a spray nozzle. The spray hose **66** is preferably connected to a spray wand **40** at a connection, such as swivel connector **76**. From the connection, the adhesive enters into the spray wand **40** past trigger switch **78**. The trigger switch **78** may allow for controlling the flow of adhesive through the wand **40** or it may be an on/off type controller. From the trigger switch **78**, adhesive flows through the wand tube **80** into the spray tip **74**. The spray tip **74** may be permanently mounted to the wand tube **80** or may be removable and replaceable. In the removable configuration, a particular spray tip **74** may be selected for a particular application. Spray tips **74** having a 17mm to 27mm orifice have been found effective depending on the

particular coverage sought by the user of the spray system **10.** At least a portion of the spray wand **40**, such as bend **82**, may be angled in order to direct spray at a particular desired location. The particular spray wand **40** utilized is of the bayonet type, however a pistol grip, other type wands **40** may be utilized.

One preferred method of operation is to place a container **20** having adhesive material within the reducible volume container **26** therein atop the sprayer housing **44**. The supply tube **34** is connected to the container **20** and the pump inlet **50**. The pump outlet **68** is connected to a hose **66** attached to a spray wand **40**. The pump **38** within the sprayer **30** will be turned on and the trigger **78** on the spray wand **40** will direct when and where the adhesive is sprayed. Other methods of operation will incorporate other features of the system **10** taught herein and will be obvious to one skilled in the art.